

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 August 2002 (01.08.2002)

PCT

(10) International Publication Number  
**WO 02/058528 A1**

(51) International Patent Classification<sup>7</sup>: **A47L 15/44,**  
**D06F 39/02, B65D 83/04**

(21) International Application Number: **PCT/EP02/00693**

(22) International Filing Date: **22 January 2002 (22.01.2002)**

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
**0101983.5** **25 January 2001 (25.01.2001)** **GB**

(71) Applicant (for AE, AG, AU, BB, BZ, CA, CY, GB, GD, GH, GM, IE, IL, KE, LC, LK, LS, MN, MW, NZ, OM, SD, SG, SL, SZ, TT, TZ, UG, ZA, ZM, ZW only): **UNILEVER PLC** [GB/GB]; Unilever House, Blackfriars, London EC4P 4BQ (GB).

(71) Applicant (for AL, AM, AT, AZ, BA, BE, BG, BR, BY, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, FR, GE, GR, HR, HU, ID, IS, IT, JP, KG, KP, KR, KZ, LR,

LT, LU, LV, MA, MC, MD, MG, MK, ML, MR, MX, MZ, NE, NL, NO, PH, PL, PT, RO, RU, SE, SI, SK, SN, TD, TG, TJ, TM, TN, TR, UA, UZ, VN, YU only): **UNILEVER NV** [NL/NL]; Weena 455, NL-3013 AL Rotterdam (NL).

(71) Applicant (for IN only): **HINDUSTAN LEVER LIMITED** [IN/IN]; Hindustan Lever House, 165/166 Backbay Reclamation, Maharashtra, Mumbai 400 020 (IN).

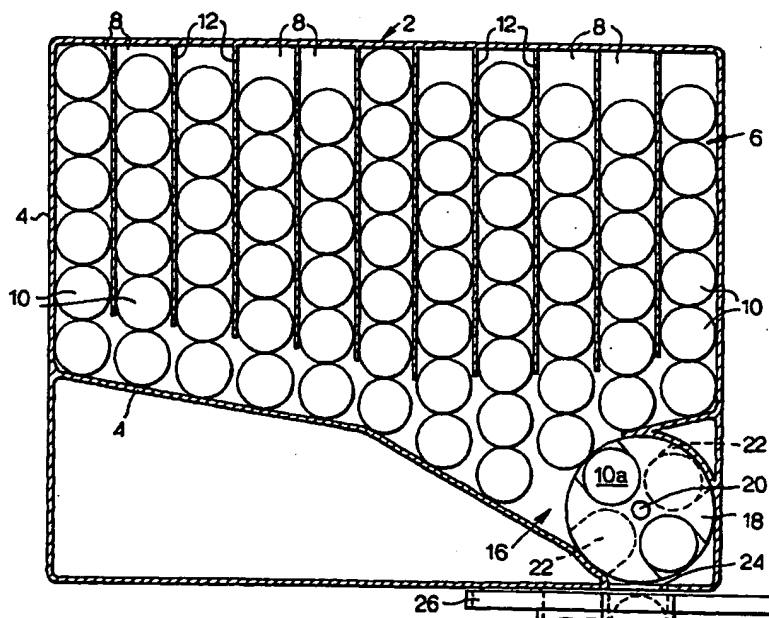
(72) Inventors: **MCNABB, Richard, Paul**; c/o Lever Faberge Ltd, P O Box 69, Port Sunlight, Wirral, Merseyside CH62 4ZD (GB). **OLDENBURG, Willem**; c/o Unilever R & D Vlaardingen, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL). **ROBERTS, Kevin**; c/o Unilever R & D Vlaardingen, Olivier van Noortlaan 120, NL-3133 AT Vlaardingen (NL).

(74) Agents: **GRIFFITHS, Helen, Sarah et al.**; Unilever PLC, Patent Department, Colworth House, Sharnbrook, Bedford, Bedfordshire MK44 1LQ (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,

[Continued on next page]

(54) Title: **DETERGENT DISPENSER SYSTEM**



(57) Abstract: A removable cartridge for a detergent dispensing system for a dishwasher comprising: a storage unit containing a plurality of cylindrical or spherical detergent tablets arranged in two or more rows with curved surfaces of adjacent tablets touching such that when the cartridge is upright the tablets will move under gravity towards a transfer station, a transfer station comprising ejection means to eject a tablet from the transfer station through a transfer port out of the cartridge, a transfer seal associated with the transfer port to prevent ingress of moisture into the cartridge.

WO 02/058528 A1



GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

- (84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## DETERGENT DISPENSER SYSTEM

### FIELD OF THE INVENTION

This invention relates to a dishwasher detergent dispenser system and in particular to a system for the controlled delivery of detergent in tablet form  
5 to a dishwasher.

### BACKGROUND TO THE INVENTION

Various proposals have been made to incorporate a storage unit in to a dishwasher for storing a plurality of detergent tablets to avoid the necessity of the user to recharge the dishwasher with detergent for each washing cycle.  
10 Examples of such devices are disclosed in DE 19620088, 19636497 and 129615674.

CA 2189115 discloses a dishwasher comprising a dispensing arrangement for the programmed delivery of cleaning agents in tablet form. The dispensing arrangement includes a storage unit for storing the detergent  
15 tablets, a separating device for removing at least one detergent tablet from the storage unit and a lock chamber. The lock chamber separates the detergent tablets stored in the storage unit from the damp ambient conditions of the washing chamber in the dishwasher. The detergent tablets are stored in several stacks in order that minimise space and the separating device can  
20 be arranged to remove a predetermined number of detergent tablets from the storage unit.

There are various problems associated with the design of a detergent dispensing system for a dishwasher. The dispensing system should have a storage unit capable of holding sufficient detergent for several wash cycles.  
25 The detergent in the storage unit must be completely protected from the damp conditions prevailing in the dishwasher since the detergent will form a solid mass when exposed to moisture. The dispensing device must have an

effective means of transferring detergent from the storage unit to the dishwasher. Ideally, the dispensing device should dispense the detergent at the appropriate time at the washing cycle.

Known dispensing devices for detergent tablets have employed  
5 detergent tablets having a diameter of at least 24 mm. In some devices the tablets have been arranged in one or more vertical stacks or columns with the circular faces of adjacent tablets in contact with one another. One of the problems associated with this arrangement is that the surface of the tablets is rough because of the granular nature of the detergent and the device for  
10 removing a tablet from the stack must be able to overcome the high frictional forces between adjacent tablets. DE 19620088 discloses a dispensing device in which the tablets are stored in a serpentine channel such that adjacent tablets touch circumferentially. However, this arrangement is wasteful of space.

15 It is an object of the present invention to provide an improved detergent dispensing system from a multitablet storage unit suitable for use in a dishwasher.

### BRIEF SUMMARY OF THE INVENTION

According to one aspect of the invention there is provided a removable  
20 cartridge for a detergent dispensing system e.g. for a dishwasher, comprising:

a storage unit containing a plurality of cylindrical or spherical detergent tablets arranged in two or more rows with curved surfaces of adjacent tablets touching such that when the cartridge is upright the tablets will move under gravity towards a transfer station,

25 a transfer station comprising ejection means to eject a tablet from the transfer station through a transfer port out of the cartridge and,

a transfer seal associated with the transfer port to prevent ingress of moisture into the cartridge.

According to a second aspect of the invention there is provided a detergent dispensing system e.g. for a dishwasher, comprising a cartridge as  
5 described above and a dispensing chamber having an inlet in communication with the transfer port of the cartridge and an outlet which may be sealed by a door.

The invention provides an effective detergent dispensing system suitable for use in a dishwasher, laundry washing machine etc., which may  
10 contain sufficient detergent tablets for many wash cycles e.g. at least ten, preferably at least thirty, which is simple to operate on the part of the user. In preferred embodiments, once the cartridge is in place the user simply selects the desired wash programme and the dishwasher dispense the correct number of tablets at the appropriate time during the wash cycle.

15 DESCRIPTION OF PREFERRED EMBODIMENTS

The detergent dispensing device of the invention is preferably positioned within the door of the dishwasher thereby does not encroach on any of the volume within the cleaning chamber. Also, it allows the user ready access for the replacement of the cartridge.

20 An essential component of the detergent dispensing system is a removable cartridge. The cartridge contains the detergent tablets and comprises a mechanism to eject the tablets from the cartridge. The cartridge also has a seal to prevent moisture ingress in to the storage area. The seal is important since ingress of moisture is likely to cause adjacent tablets to  
25 agglomerate causing them to jam in the storage unit. Preferably, the entire cartridge is replaced when it is emptied and thus the transfer mechanism and seal will be replaced when a new cartridge is in place. This feature is

desirable since it obviates the need to utilise a transfer mechanism and seal which will last the life of the dishwasher and furthermore it reduces the routine maintenance required to keep the dishwasher in perfect running order.

The cartridge utilises spherical or cylindrical detergent tablets.

- 5   References to detergent tablets herein refer not only to detergent tablets but also to tablets composed of other dishwashing active ingredients e.g. water softeners and rinse aids. The tablets are formed by compaction or pressure moulding of powdered ingredients in a conventional manner.

- 10   The spherical tablets preferably have a diameter in the range 10 to 20mm. The cylindrical tablets used in the cartridge preferably have a diameter in the range 10 to 20mm and a length which is at least 10% different to the diameter. The reason for the difference in length is to prevent the tablets rotating out of alignment in the rows within the dishwasher. A preferred cylindrical tablets has a diameter of about 17 mm and a length of  
15   about 12 mm. The edge between the circular face and cylindrical surface desirable chamfered since this assists in the manufacture of the tablets by compression moulding and also reduces the propensity of the tablets to chip during transportation and storage.

- 20   The tablets are arranged in the cartridge in substantially vertical rows when the cartridge is in its upright position. The storage unit comprises a sloping floor or glides to direct tablets towards the transfer station. The transfer station can be at one corner of the cartridge in which case the floor will slope towards that corner. Alternatively, the transfer station may be located spaced from a corner in which case the sloping floor may be in the  
25   form of a funnel.

Adjacent rows of tablets are preferably separated by guides which are spaced apart slightly more than the diameter of the cylinder or sphere of the detergent tablets. The use of guides is particularly advantageous since it

prevents lateral displacement of the tablets and reduces movement of the tablets when the door of the dishwasher is repeatedly opened and closed. Thus, as well as controlling the orientation of the tablets the guides reduce the propensity of the tablets to impact violently upon each other which could  
5 cause breakage of tablets resulting in incorrect dosing or the tablets jamming in the cartridge.

In one embodiment of the invention the storage unit is divided in to two halves by a central wall such that there are two sets of tablets arranged in respective sets of rows. Each set of tablets is associated with its own ejection  
10 means.

The tablets may be ejected from the cartridge by any suitable mechanism. For example, the transfer station may simply comprise a door or shutter which is opened for a pre-determined length of time to allow one or more tablets to drop from the storage station out of the cartridge through the  
15 transfer port. Alternatively, the transfer station may comprise a plunger or piston which pushes a tablet in the transfer station through the transfer port to eject the tablet from the cartridge. In preferred embodiments of the invention the ejection means comprises a wheel, rotatably about a substantially horizontal axis when the cartridge is in its upright position, the wheel having a  
20 plurality of circumferential chambers dimensioned to accommodate a tablet.

In one embodiment the cartridge is arranged such that a tablet in the transfer station moves under gravity in to a chamber in the wheel, rotation of the wheel transports the tablet towards the transfer port where it falls out of the chamber through the transfer port and is ejected from the cartridge.

25 In a second embodiment the wheel is constructed and arranged such that a tablet in the transfer station moves under gravity in to a chamber in the wheel, rotation of the wheel transports the tablet to the transfer port where it partially falls out of the chamber and further rotation of the wheel causes a

cam surface on the wheel to contact the tablet and push the tablet through the transfer port to eject it from the cartridge. This embodiment is particularly useful where it is necessary to apply force the tablet to push it through the transfer seal.

- 5           In a further embodiment the wheel is constructed and arranged such that a tablet in the transfer system moves under gravity in to a chamber in the wheel, rotation of the wheel transports the tablet towards the transfer port and further rotation of the wheel causes the chamber to partially collapse thereby expelling the tablet from the chamber through the transport port and ejecting it
- 10   from the cartridge. In this embodiment the chambers in the wheel are flexible and they are deformed as the wheel rotates e.g. by contacting a projection or pin formed in the wall of the transfer station. The walls are deformed in such a manner that the tablet is pushed radially outward from the chamber.
- 15           When there are two sets of tablets arranged in the cartridge the ejection means may conveniently comprise two wheels rotatable about a common axis. The wheels may be independently rotatable thereby allowing a different type of table to be used in each set which may be ejected from the cartridge and dispensed independently. Alternatively, the two wheels may be
- 20   fixed related to each other with chambers off-set such that rotation of the wheel causes alternate ejection of a tablet from each set of tablets.

          Generally, the transfer seal covers the transfer port. In one embodiment the seal may act as a door or shutter movable between a closed position which seals the transfer port and an open position which allows

25   ejection of a tablet through the transfer port. Such a seal may be sliding rotatable or hinged. Preferably, the transfer seal is in the form of an elastomeric film covering the transfer port and having one or more slits which



allow a tablet to be pushed through the seal. Suitable elastomeric materials include rubber, plastics etc. e.g. silicone.

Alternatively, or in addition, the circumferential edge of the wheel may form a seal with the housing of the cartridge or edge of the transfer port.

- 5        The cartridge may have a manual actuation mechanism e.g. a handle to allow the user to eject the appropriate number of tablets from the cartridge before the washing cycle is started. Preferably, the dispensing system comprises control means and drive means to actuate the ejection means of the cartridge. In such an embodiment, the ejection means comprises means  
10    to engage the drive means on the dishwasher e.g. cog wheel etc.

- Since replacement cartridges loaded with detergent tablets will be stored ready to replace an exhausted cartridge, it is desirable that the cartridge is sealed in a manner to prevent ready access to the detergent tablets therein e.g. to prevent children extracting the detergent tablets. In  
15    embodiments where the cartridges are not intended to be refilled the only point of access to the tablets will be via the transfer port. The transfer port may be sealed with a tamper proof seal which is broken off prior to insertion of the cartridge. Alternatively, or in addition, the wheel of the ejection means may be immobilised prior to insertion of the cartridge. The housing of the  
20    cartridge may conveniently be manufactured of transparent plastics so that the contents may be viewed.

- The cartridge is in communication with the inlet of a dispensing chamber. The dispensing chamber has an outlet which may be sealed by a shutter or door. One or more tablets ejected from the cartridge passes to the  
25    dispensing chamber. The tablets are held in the dispensing chamber until the door is opened at the appropriate time during the washing cycle to introduce the tablet(s) in to the washing chamber of the dishwasher. In order to minimise the possibility of moisture ingress in to the dispensing chamber and

thence to the cartridge, the door of the dispensing chamber is preferably biased to its closed position sealing the outlet of the dispensing chamber. The door is opened only for a sufficient time to allow the tablet(s) to exit the dispensing chamber and then the outlet of the dispensing chamber is

5 immediately sealed. The possibility of moisture ingress can be further reduced by dispensing the tablets into the washing chamber while the water therein is quiescent i.e. not during spraying or agitation in the washing cycle, and ensuring the outlet is sealed when water is sprayed and also during the drying cycle to prevent ingress of water vapour.

10 The outlet of the dispensing chamber is conveniently sealed by a door. The door may conveniently be pivoted about a horizontal axis at its upper or lower edges. In accordance with a one embodiment the door is substantially vertical when sealing the outlet of the dispensing chamber and is pivoted about a horizontal axis at the bottom of the door. The door comprises a

15 substantially horizontal extension which forms the base of the dispensing chamber when the door is in its closed position. Thus, tablets entering the dispensing chamber from the cartridge will lodge on the horizontal extension of the door. As the door pivots downwardly to its open position the extended portion forming the base of the chamber is caused to pivot upwardly thereby

20 expelling the tablets from the dispensing chamber.

The transfer port of the cartridge may communicate directly with the inlet of the dispensing chamber. For example, the cartridge may be positioned directly above the dispensing chamber so that tablets ejected through the transfer port of the cartridge drop into the dispensing chamber.

25 Alternatively, the cartridge may be displaced relative to the dispensing chamber and an intermediate passage and/or holding chamber may be between the transfer port of the cartridge and the inlet of the dispensing chamber. In such an arrangement, if the tablets are not able to fall in to the dispensing chamber under the influence of gravity, conveyor means may be

provided to move the tablets through the intermediate passage and/or holding chamber into the dispensing chamber. Any suitable conveyor means may be used e.g. a plunger or piston to push tablets from the intermediate passage or holding chamber in to the dispensing chamber.

- 5           The cartridge may conveniently comprise one or more recognition features which are detectable by a detection system in the dishwasher to identify the contents of the cartridge. The recognition features may be physical e.g. projections, lugs etc. which are engageable with a detection system in the dishwasher. Alternatively, the cartridge may have a code
- 10   pattern applied to its surface e.g. a bar code or DX-type code, which may be detected by a detection system in the dishwasher to identify the contents of the cartridge. In a further embodiment, the cartridge may comprise a micro chip containing information about the contents of the cartridge which may be read by a detection system in the dishwasher.
- 15           The dishwasher preferably comprises control means to control the ejection of tablets from the cartridge and/or release of tablets from the dispensing chamber. The control means may receive information from any detection system in the dishwasher and act upon the information received. The control means may conveniently release tablets from the dispensing
- 20   chamber at pre-determined time during wash cycle and also ensure that the door of the dispensing chamber closes immediately after releasing the tablets. The control means may also operate to eject the requisite number of tablets from the cartridge in response to a particular wash programme selected on the dishwasher. For example, a plurality of tablets may be ejected for a heavy
- 25   wash programme and a single tablet for a light wash programme. The control means may also allow multiple dispensing of tablets during a single wash cycle. Thus, a tablet may be dispensed during the prewash and a further one or more tablets may be dispensed during the main wash. If there are different

types of tablets in the storage unit a different tablet may be dispensed for the rinse cycle etc.

The dishwasher preferably comprises means to detect and signal when the cartridge is substantially empty in order that the user may obtain a fresh  
5 cartridge before the existing cartridge has expired. In one embodiment, the dishwasher may automatically order a new cartridge from the supplier e.g. via the internet, when the cartridge is almost empty.

The invention will now be described with reference to the accompanying drawings in which:

10 Figure 1 represents a cross-section through a cartridge in accordance with the invention;

Figures 2 represents a cross-section through an alternative cartridge in accordance with the invention;

15 Figures 3a, 3b, 3c and 3d represent a cross-section, partial cross-sectional plan, perspective view and partial perspective view respectively of a further cartridge in accordance with the invention;

Figure 4 represents an exploded view of the ejection means of the cartridge shown in Figure 3 and

20 Figures 5a and 5b represent diagrams of a front and sectional side view of a further dispensing system in accordance with the invention .

In the drawings, like numerals represent like parts.

Figure 1 illustrates a cartridge 2 comprises a housing 4 defining a storage unit 6 having a plurality of rows 8 of detergent tablets 10. The detergent tablets 10 are cylindrical in shape and are arranged such that

adjacent tablets in a row touch circumferentially. The rows are separated by guides 12 which restrict movement of the detergent tablets.

The cartridge has a sloping floor 14 such that tablets in the storage unit 6 drop under gravity towards the transport station 16. The guides are  
5 dimensioned so that the lower most tablet in each row may roll over the floor 14 towards the transport station 16.

The ejection means comprises a wheel 18 mounted for rotation about axis 20. The wheel comprises four circumferential chambers 22 which are dimensioned to accommodate a tablet. In use, a tablet (shown as 10a) enters  
10 a circumferential chamber 22 and the wheel is rotated clockwise to transport the tablet 10a to the transfer port 24 as the tablet reaches the facility of the transfer port 24, sliding seal 26 is displaced allowing the tablet to drop out of the chamber 22 through the transfer port 24 thereby being ejected from the cartridge.

15 Figure 2 shows a cartridge of similar construction to Figure 1 with the exception that the wheel 18 comprises cam surfaces 28. A detergent tablet 10a is held in the circumferential chamber 22 and transported from the storage unit to the transfer port 24. The seal 26 may be a sliding seal or a fixed seal comprising a flexible elastomer having a slit therein. Instead of  
20 dropping completely through the transfer port the tablet 10a is partially displaced from the chamber 22 and as the wheel is further rotated the following cam surface 28 pushes against the tablet urging it through the transfer port 24 and ejecting it from the cartridge.

Figures 3 and 4 illustrate an alternative cartridge in accordance with  
25 the invention. In this embodiment the cartridge comprises two sets of detergent tablets (not shown) separated by an internal wall 13.

The ejecting means comprises two wheels 30, 32 (Figure 4) each having two chambers 22. The wheels 30, 32 may be independently rotatable about axis 20 or they may be fixed relative to each other with the chambers off-set as shown in Figure 4. The walls of the chambers 22 are constructed of deformable plastics material. A handle 34 is shown for manual rotation of the wheel although it is preferred that the device is rotated by drive means mounted in the dishwasher.

The transfer port 24 is covered by a transfer seal which is a fixed film of elastomer 25 having a slits 27 therein, one slit for each set of tablets. As the wheel is rotated in the direction of the arrow shown in Figure 3a a detergent tablet 10a is transported from the storage unit towards the transfer port 24. As the tablet 10a approaches the patient port the wall 36 of the circumferential chamber engages a pin 38 projecting from the housing of the cartridge causing the wall to deform as the rotation of the wheel continues and push the tablet through the transfer port and slit 27 in the transfer seal 25. The pin 38 projects to an extent that it just engages the edge of the wall 36. On further rotation of the wheel the wall 36 deforms until it is able to slide under the pin 38 and free rotation continues until the next portion of the wall 36 engages the pin.

Figures 5a and 5b diagrammatically illustrate the arrangement of a cartridge and dispensing chamber in accordance with the invention. The cartridge is as illustrated in Figures 3 and 4.

The dispensing chamber 40 comprises a housing 44. The outlet of the dispensing chamber is closed by a door 50 which is pivoted about a horizontal axis 52 at the base of the door. The door additionally comprises an extended portion 54 which forms the base of the dispensing chamber 40 when the door is in its closed position. Thus, tablets from the cartridge 2 will fall on to the extended portion 54 when they are transferred from the cartridge. When the

door 50 is opened by pivoting about axis 52 to the position shown in phantom outline, the extended portion 54 will pivot together with the door thereby transporting any tablets in the dispensing chamber through the outlet in to the washing chamber of the dishwasher.

CLAIMS

1. A removable cartridge for a detergent dispensing system, e.g. for a dishwasher, comprising:
  - 5 a storage unit containing a plurality of cylindrical or spherical detergent tablets arranged in two or more rows with curved surfaces of adjacent tablets touching such that when the cartridge is upright the tablets will move under gravity towards a transfer station,
  - a transfer station comprising ejection means to eject a tablet from the
  - 10 transfer station through a transfer port out of the cartridge,
  - a transfer seal associated with the transfer port to prevent ingress of moisture into the cartridge.
2. A removable cartridge as claimed in Claim 1 in which, when the cartridge is in its upright position the tablets are arranged in substantially
- 15 vertical rows and the storage unit comprises a sloping floor to direct tablets towards the transfer station.
3. A removable cartridge as claimed in Claim 2 in which adjacent rows of tablets are separated by guides to prevent lateral displacement of tablets from a row.
- 20 4. A removable cartridge as claimed in any preceding claim in which the tablets are substantially cylindrical having a diameter in the range 10 to 20mm and a length which is at least 10% different from the diameter.
5. A removable cartridge as claimed in Claim 4 in which the tablets have a length greater than the diameter.



6. A removable cartridge as claimed in any preceding claim in which there are two sets of tablets which are arranged in respective sets of rows each set of tablets having its own ejection means.
- 5 7. A removable cartridge as claimed in any preceding claim in which the ejection means comprises a wheel rotatable about a substantially horizontal axis when the cartridge is in its upright position, the wheel having a plurality of circumferential chambers dimensioned to accommodate a tablet.
- 10 8. A removable cartridge as claimed in Claim 7 in which the wheel is constructed and arranged such that a tablet in the transfer station moves under gravity into a chamber in the wheel and rotation of the wheel transports the tablet to the transfer port where it falls out of the chamber through the transfer port.
- 15 9. A removable cartridge as claimed in Claim 7 in which the wheel is constructed and arranged such that a tablet in the transfer station moves under gravity into a chamber in the wheel, rotation of the wheel transports the tablet to the transfer port where it partially falls out of the chamber and further rotation of the wheel causes a cam surface on the wheel to contact the tablet and push the tablet through the transfer port.
- 20 10. A removable cartridge as claimed in Claim 7 in which the wheel is constructed and arranged such that a tablet in the transfer station moves under gravity in to a chamber in the wheel, rotation of the wheel transports the tablet towards the transfer port and further rotation of the wheel causes the chamber to partially collapse expelling the tablet from the chamber through the transfer port.
- 25 11. A removable cartridge as claimed in any one of Claims 7 to 10 in which there are two sets of tablets arranged in respective sets of rows and the ejection means comprises two wheels rotatable about a common axis.

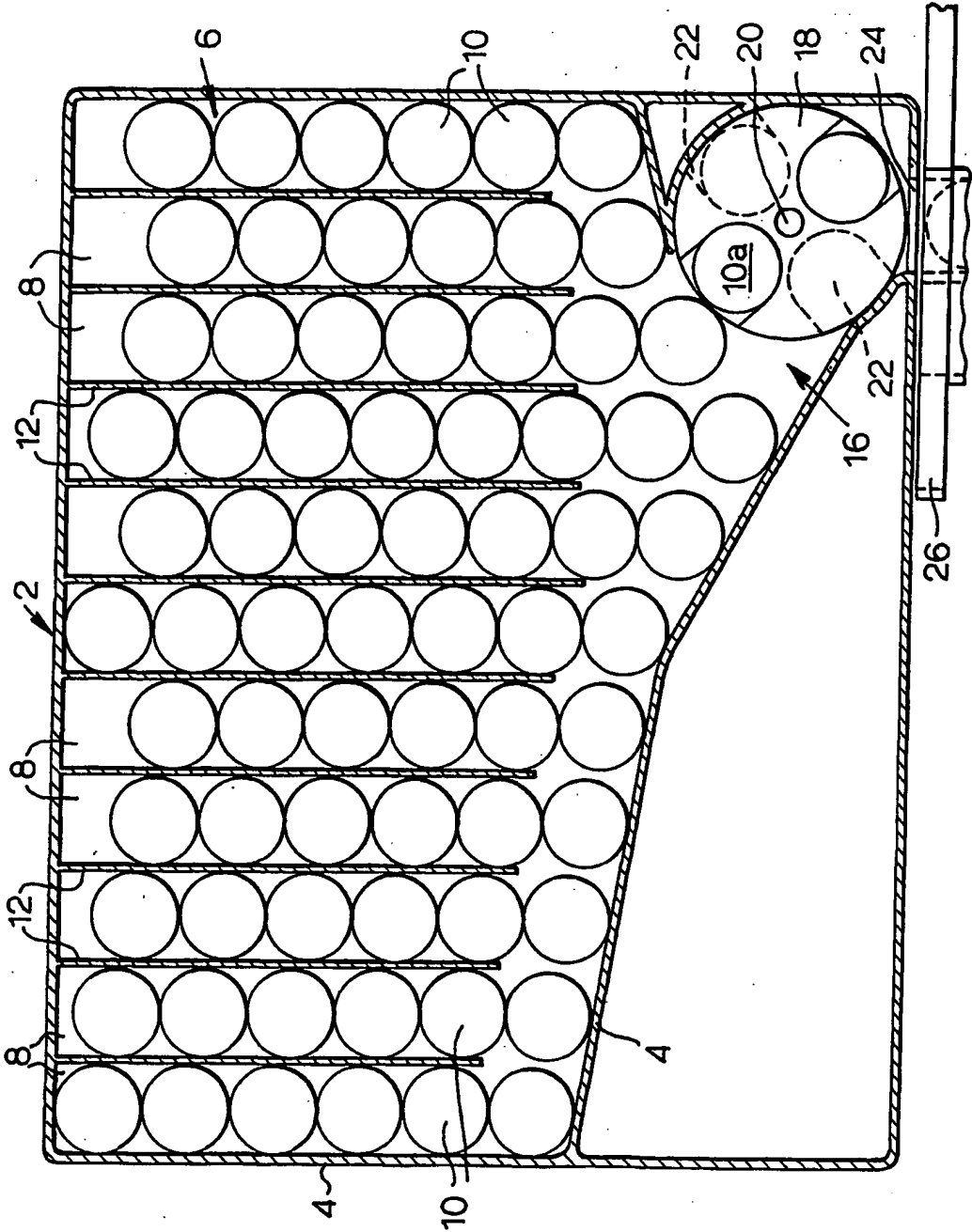
12. A removable cartridge as claimed in Claim 11 in which the two wheels are fixed relative to each other with chambers off-set such that rotation of the wheels causes alternate transport of tablet from each set of tablets.
- 5 13. A removable cartridge as claimed in any preceding Claim in which the transfer port is covered by a transfer seal which is moved aside when a tablet is ejected from the cartridge.
14. A removable cartridge as claimed in any one of Claims 1 to 12 in which the transfer port is covered by a transfer seal in the form of an elastomeric film having one or more slits therein and the tablet is pushed through the  
10 elastomeric as it is ejected from the cartridge.
15. A cartridge as claimed in any preceding claim comprising means to manually operate the ejection means.
16. A removable cartridge as claimed in Claims 1 to 14 in which the ejection means comprises means to engage with drive means mounted on the  
15 dishwasher.
17. A removable cartridge as claimed in any preceding claim in which the cartridge is sealed to prevent ready access to detergent tablets therein.
18. A removable cartridge as claimed in any preceding claim in which the cartridge comprises a housing comprising transparent material so that the  
20 tablets therein are visible.
19. A removable cartridge as claimed in any preceding claim which comprises one or more physical recognition features engageable with a detection system to identify the contents of the cartridge.

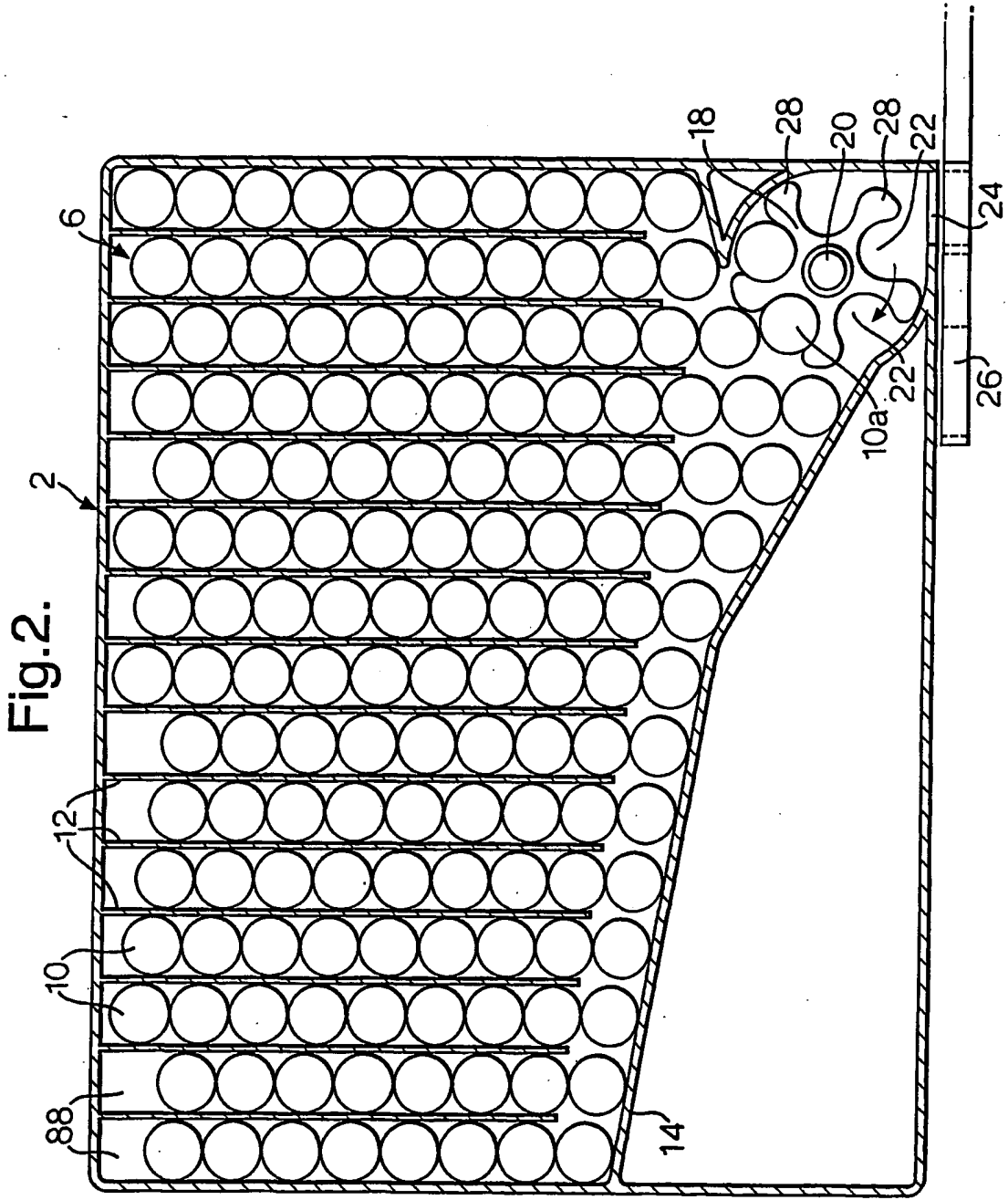
20. A removable cartridge as claimed in Claims 1 to 18 which comprises a code pattern applied to its surface which may be detected by a detection system to identify the contents of the cartridge.
- 5 21. A removable cartridge as claimed in Claims 11 to 18 which comprises a microchip containing information of the contents of the cartridge.
22. A detergent dispensing system for a dishwasher comprising a cartridge as claimed in any preceding claim and a dispensing device having an inlet in communication with the transfer port of the cartridge and an outlet for dispensing tablets which outlet may be sealed by a door.
- 10 23. A detergent dispensing system as claimed in Claim 22 in which the dispensing devices comprises means to maintain the door in its closed position sealing the outlet except when dispensing tablets.
24. A detergent dispensing system as claimed in Claim 23 in which the door of the dispensing chamber is spring biased to its closed position sealing  
15 the outlet.
25. A detergent dispensing system as claimed in any one of Claims 22 to 24 in which the transfer port of the cartridge communicates directly with the dispensing chamber of the dispensing device.
26. A detergent dispensing system as claimed in Claim 25 in which the  
20 cartridge is positioned directly above the dispensing chamber.
27. A detergent dispensing system as claimed in Claims 22 to 24 which comprises an intermediate passage and/or holding chamber between the transfer port of the cartridge and the dispensing device.

28. A detergent dispensing system as claimed in Claim 27 which additionally comprises conveyor means to move tablets in the intermediate passage or holding chamber into the dispensing chamber.
29. A detergent dispensing system as claimed in Claim 28 in which the  
5 conveyor means comprises a plunger to push tablets from the intermediate passage or holding chamber into the dispensing chamber.
30. A detergent dispensing system as claimed in Claims 22 to 29 additionally comprising control means to control ejection of tablets from the cartridge and/or release of tablet(s) from the dispensing chamber.
- 10 31. A detergent dispensing system as claimed in Claim 30 in which the control means releases tablet(s) from the dispensing chamber at a predetermined time in the wash cycle.
32. A detergent dispensing system as claimed in Claims 30 or 31 in which the control means closes the door of the dispensing chamber immediately  
15 after releasing tablet(s),
33. A detergent dispensing system as claimed in Claims 29 or 30 in which the control means releases tablets from the dispensing chamber after water has entered the dishwasher but before water is circulated.
34. A detergent dispensing system as claimed in Claims 30 to 32 in which  
20 the control means operates to eject a requisite number of tablets from the cartridge in accordance with the wash programme selected on the dishwasher.
35. A detergent dispensing system as claimed in Claims 30 to 34 in which the control means causes dispensing of tablets at different stages in a wash  
25 cycl .

36. A detergent dispensing system as claimed in Claims 34 to 35 comprising a cartridge as claimed in any one of Claims 19 to 21 in which the control means dispenser tablets based on information detected about the contents of the cartridge.
- 5 37. A detergent dispensing system as claimed in any one of Claims 22 to 36 in which the door of the dispensing device is pivoted about a horizontal axis at its upper or lower edge.
38. A dishwasher comprising a detergent dispensing system as claimed in any one of Claims 22 to 37.
- 10 39. A dishwasher as claimed in Claim 38 in which the detergent dispensing system is mounted in the door of the dishwasher.
40. A dishwasher as claimed in Claims 38 or 39 which additionally comprises means to signal when the cartridge is substantially empty.
- 15 41. A detergent tablet comprising compacted particles of dishwasher active ingredient(s) characterised in that it is in the form of a sphere having a diameter of from 10 to 20mm or in substantially cylindrical form having a diameter of 10 to 20mm and a length which is at least 10% different to its diameter.
- 20 42. A detergent tablet as claimed in Claim 41 in the form of a cylinder having a diameter of about 17mm and a length of about 12mm.
43. A detergent tablet as claimed in Claims 41 or 42 in the form of a cylinder in which the edges between the circular face and side are chamfered.
44. A cartridge comprising a storage unit and a transfer port containing a plurality of detergent tablets as claimed in any one of Claims 41 to 43.

Fig.1.





3/6

Fig.3(A).

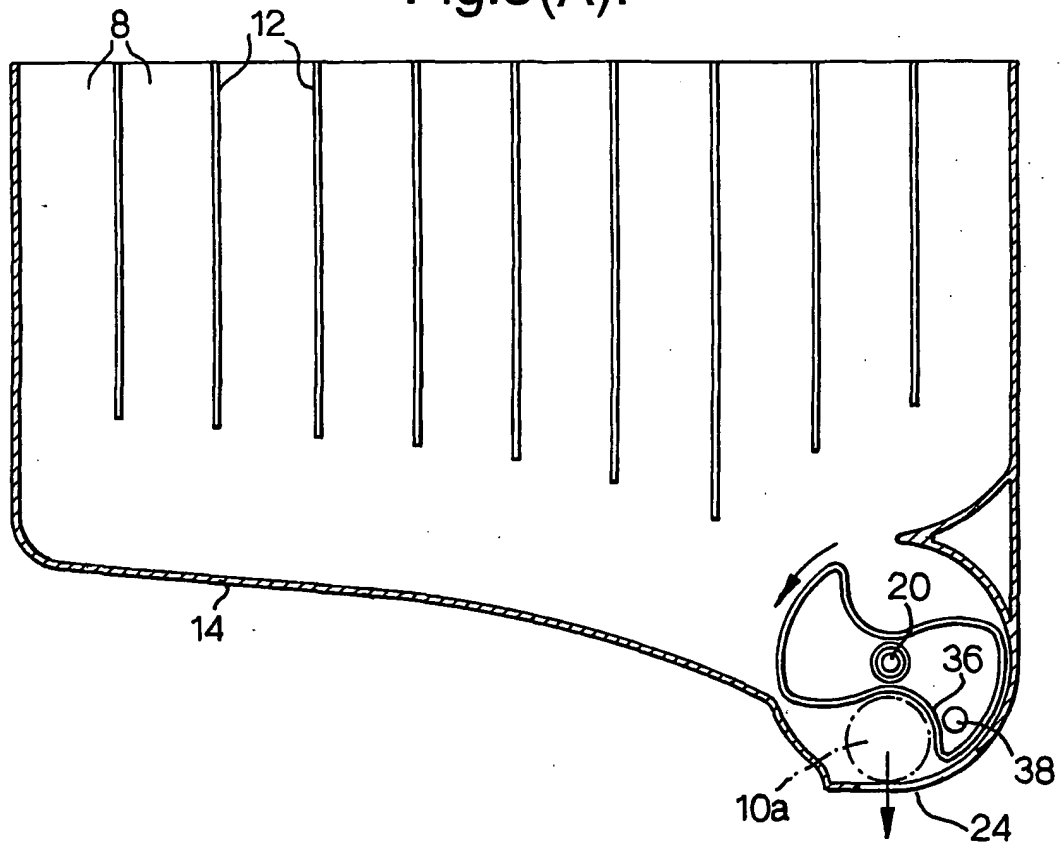


Fig.3(B).

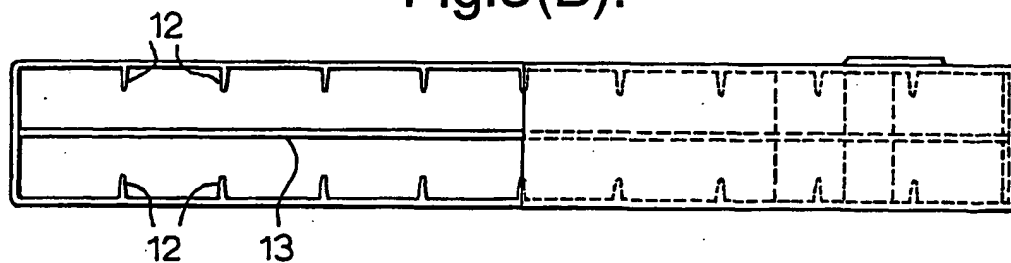




Fig.3(C).

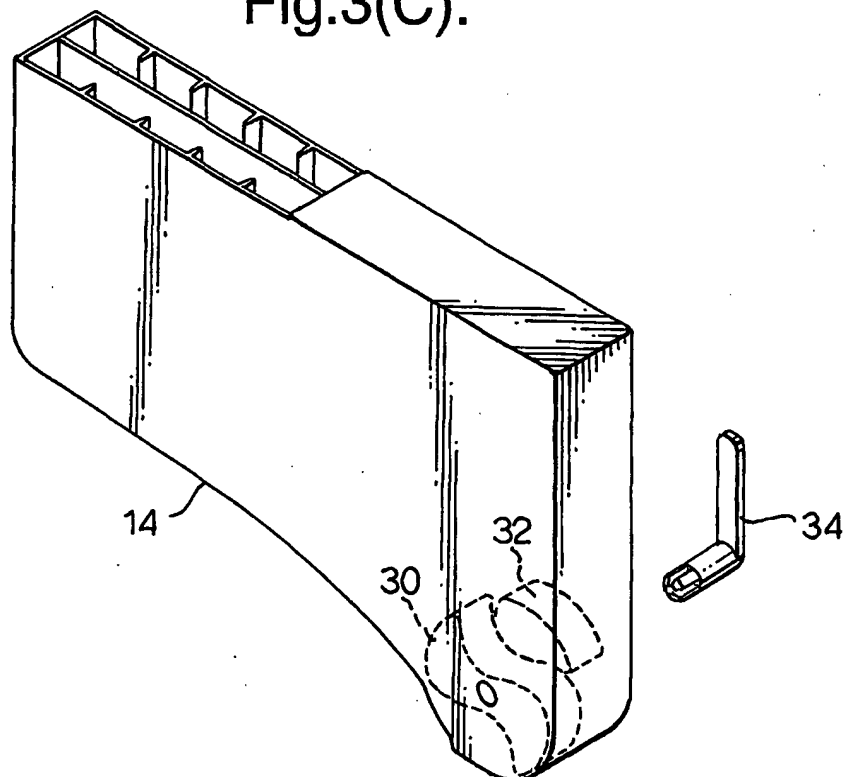
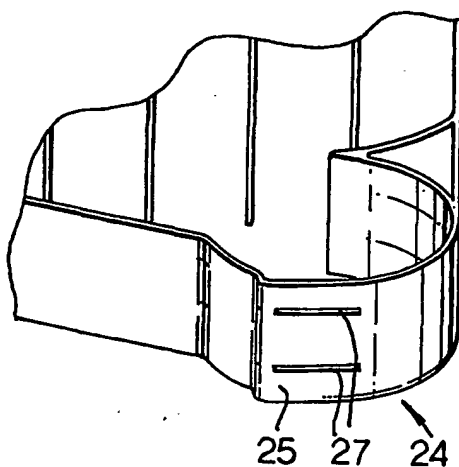


Fig.3(D).



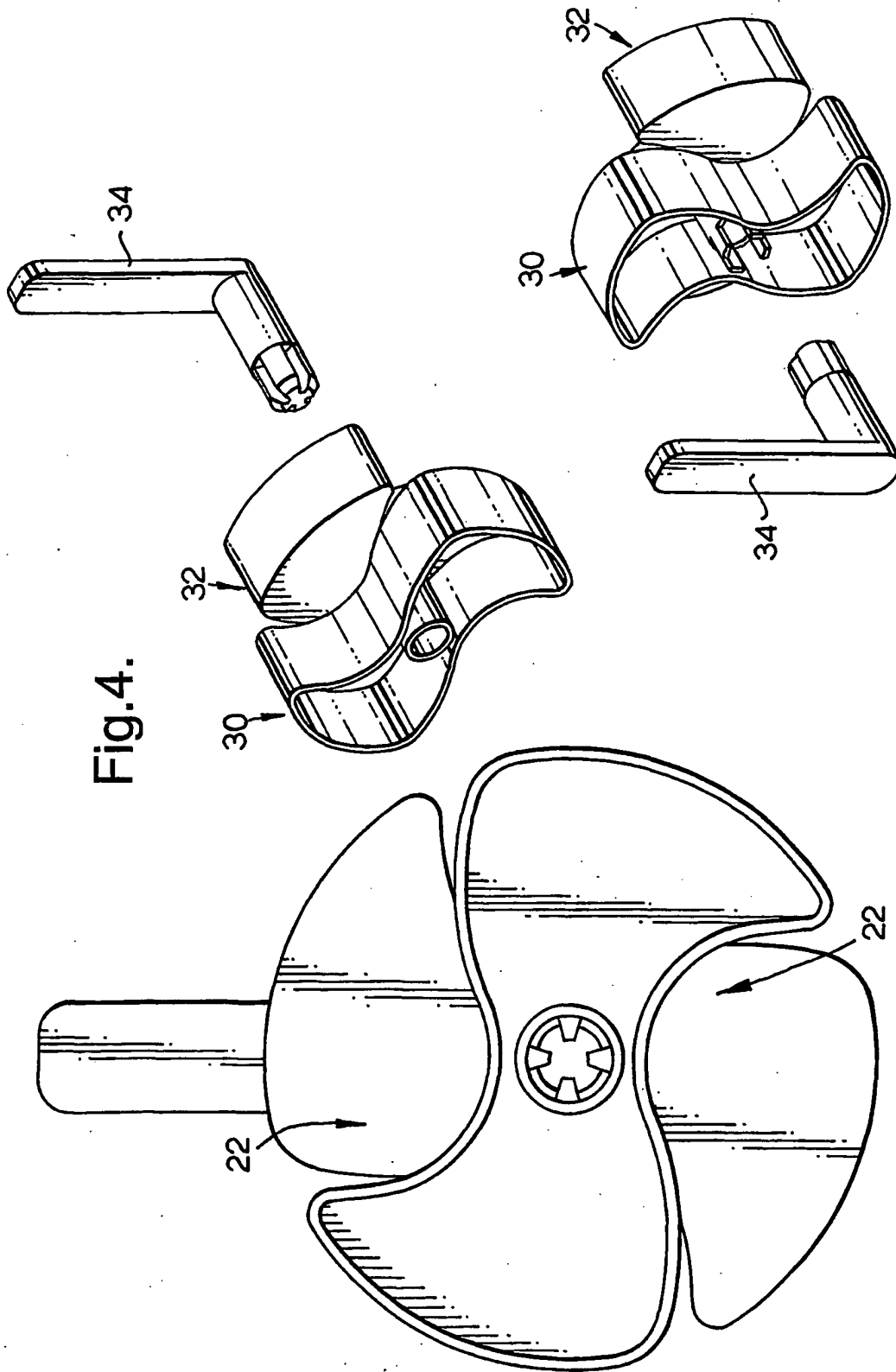


Fig.5(A).

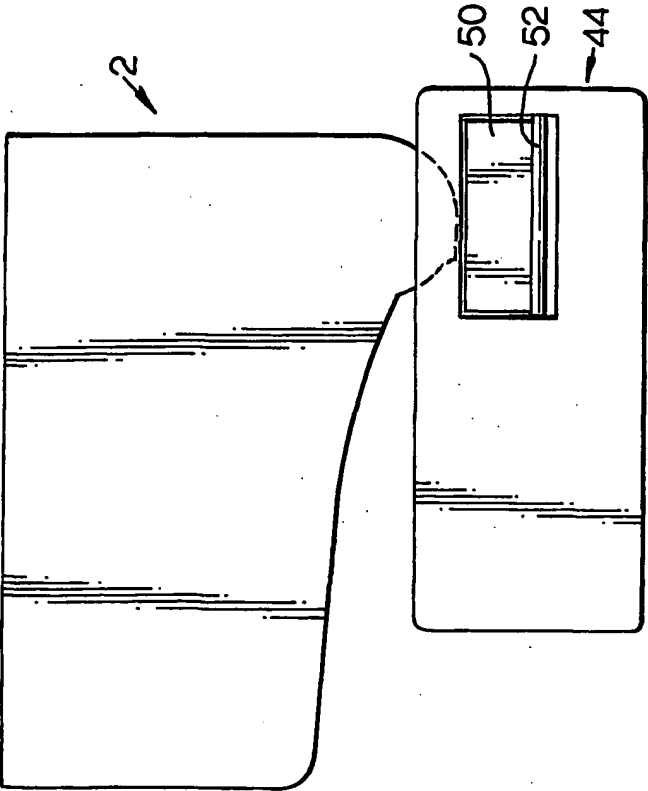
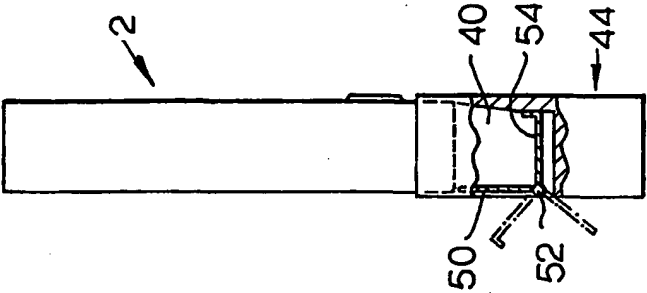


Fig.5(B).



## INTERNATIONAL SEARCH REPORT

Intern Application No

PCT/EP 02/00693

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A47L15/44 D06F39/02 B65D83/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A47L D06F B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 40 958 A (AEG HAUSGERAETE GMBH) 7 May 1997 (1997-05-07) cited in the application  the whole document	1-6, 13, 16, 17, 22-24, 27-29, 38, 41-44
X	WO 99 24548 A (METZGER GROOM SABINE URSULA ;SPEED LYNDIA ANNE (GB); SONG XIAOQING) 20 May 1999 (1999-05-20) the whole document	41-43
A	DE 43 44 205 A (AWECO KUNSTSTOFFTECH GERAETE) 29 June 1995 (1995-06-29)  the whole document	1, 7, 8, 16, 38, 39, 44

-/-

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

18 June 2002

Date of mailing of the international search report

25/06/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Norman, P

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 02/00693

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 829 085 A (JERG HELMUT ET AL) 3 November 1998 (1998-11-03)  the whole document	1,2,7,8, 17,22, 23,27
A	DE 196 20 088 A (KAUTZ STEFAN ;WISMAR JOERG PETER (DE)) 20 November 1997 (1997-11-20) cited in the application the whole document	1-44
A	GB 1 123 107 A (DYNAMIT NOBEL AG) 14 August 1968 (1968-08-14) the whole document	1,3
A	DE 197 40 819 A (AKO WERKE GMBH & CO) 18 March 1999 (1999-03-18) the whole document	1,19-21
A	EP 0 461 870 A (DIVERSEY CORP) 18 December 1991 (1991-12-18) the whole document	1,22,38